

## NASA'S Mission Lucy

The National Aeronautics and Space Administration (NASA) is set to launch the Lucy Mission on October 16, 2021. The Lucy space probe will be on a 12-year voyage to Jupiter's orbit, where it will explore the asteroids (known as Jupiter Trojans or Trojan Asteroids) that share Jupiter's orbit along with the Sun.

The objective of Mission Lucy is to uncover the origins of the universe, whose data can be found on the surface of the Trojan asteroids. The Lucy spacecraft itself is the centrepiece of a US\$981 million mission.

This article will further give information about Mission Lucy that will be useful in the science and technology segment of the IAS Exam.

### Objectives of the Lucy Mission

Mission Lucy will set out on a voyage which may answer questions pertaining to the origins of the universe. The spacecraft, equipped with a high-gain antenna, high-tech cameras, infrared spectrometer and thermometer, will examine features of asteroids by capturing their physical properties.

Some of those physical properties are listed below:

- **Geology of the surface:** This includes shape, crater size structure and layers
- **Surface composition and colour:** Tones and colours of the rock, mineral makeup, loose soil composition etc
- **Interior and bulk properties:** Masses, densities, powder blankets around craters
- **Satellites and rings:** A few of the asteroids might have mini-asteroids orbiting them, as though they're the centre of their own solar system.

### Details of Mission Lucy

Further details of the Lucy Mission is given in the table below:

<b>Details of NASA's Mission Lucy</b>
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<b>Alternate Name</b>	Discoverer Mission 13
<b>Type</b>	Fly-by of Asteroids
<b>Manufacturer</b>	Lockheed Martin
<b>Launch mass</b>	1,500 kg (3,300 lb)
<b>Dimensions</b>	13 m (43 ft) in long Each solar panel: 6 m (20 ft) in diameter
<b>Launch date</b>	16 October 2021 (planned)
<b>Rocket</b>	Atlas V 401 (AV-096)
<b>Launch site</b>	Cape Canaveral

### What are the Trojan Asteroids?

Trojan asteroids are those asteroids which have been caught between the gravitational pull of the sun and of Jupiter. They are primitive pieces of rock that have been formed billions of years ago.

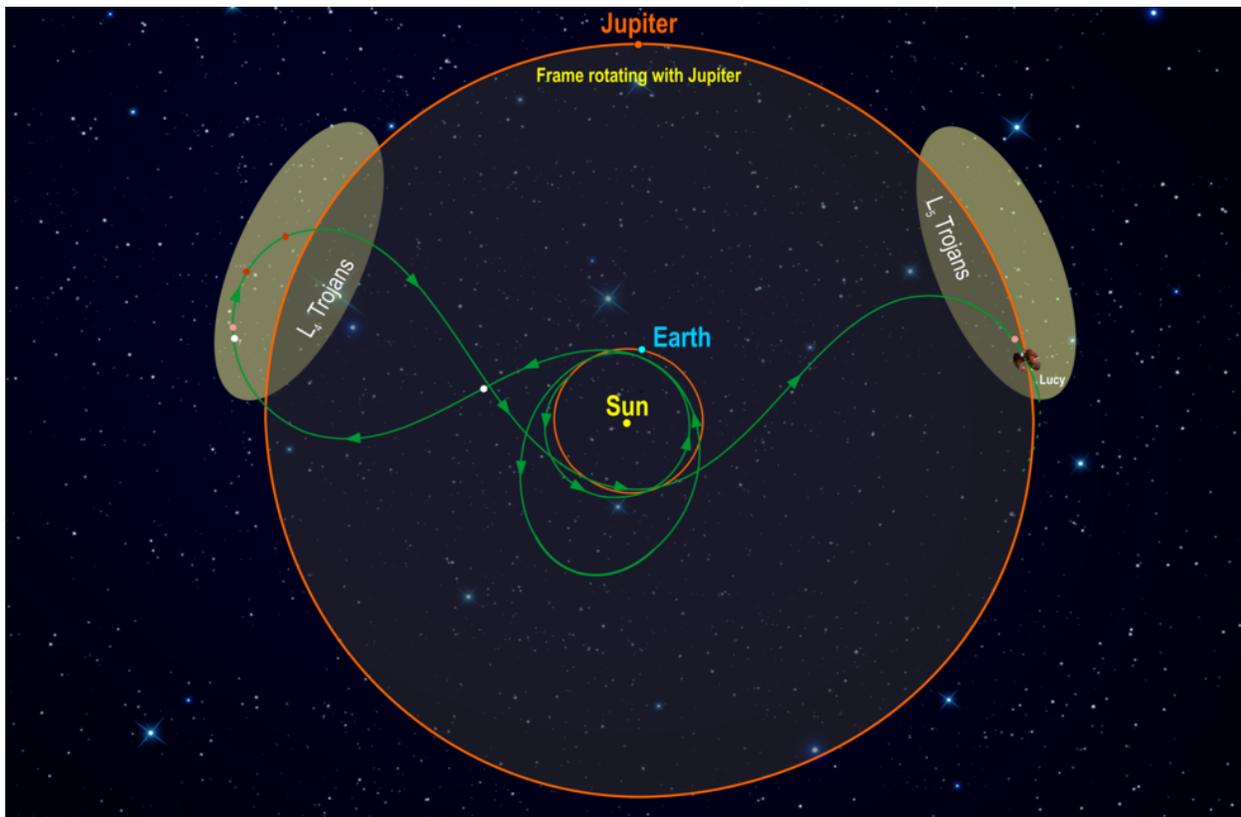
Before planets came into existence, the solar system was filled with trillions of rocky bodies orbiting a nascent sun. Some of these rocks began to fuse together to form larger planets like the Earth, Mars, Venus etc. But some floating rocks were left over.

Swept along the gravitational pull into the depths of the universe, these rocks carried with them the secret of the origins of the universe. Some of these rocks now form the Trojan asteroids orbiting Jupiter.

NASA describes them as the "time capsules from the birth of our solar system" as they contain valuable data from that period. Over 7000 has been detected so far.

The Lucy spacecraft will visit eight such asteroids in its 12-year voyage. The mission is the first of its kind to go to an asteroid. The spacecraft will use traditional chemical propulsion technology that will help with manoeuvring.

Lucy spacecraft's orbital path (marked in green) is shown in the picture below:



### Frequently asked Questions about Mission Lucy

#### **Why was the name 'Lucy' chosen for the mission?**

'Lucy' is the name given to the first fossilized skeleton of the human ancestor discovered in Africa in 1974. Its discovery provided major insights into humanity's evolution, even changing the common perception of evolution at the time.

Similarly, the NASA mission to Jupiter's Trojan Asteroids is set to revolutionize knowledge of planets and by extension the solar system. Hence, this was the reason why the name 'Lucy' was chosen.

#### **Where are the Trojan asteroids?**

The Trojan asteroids are located at the Lagrangian points, L4 and L5, located 60 degrees in front of and behind Jupiter respectively. Due to perturbations by the other planets, their distributions are elongated along the orbit.